COMMENTARY: ETHICAL AND LEGAL CONSIDERATIONS FOR THE INCLUSION OF UNDERSERVED AND UNDERREPRESENTED IMMIGRANT POPULATIONS IN PRECISION HEALTH AND GENOMIC RESEARCH IN THE UNITED STATES

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There has been growing recognition of the importance of diversity and inclusion of underrepresented minority populations, including immigrants, in genomic research and precision medicine. Achieving diversity has been difficult and has led some scholars to question whether the law is a help or a threat to the inclusion of underserved and underrepresented immigrant populations. In this commentary, I provide an overview of some of the many relevant legal issues affecting the inclusion of immigrants in genomic research and precision health initiatives, such as the *All of Us*^{SM} Research Program. Development of research recruitment, retention, and data collection plans without also considering the legal and sociopolitical context within which such efforts are to be carried out is risky. Advancing health policy with a goal of eliminating health disparities (or, at a minimum, ensuring that health disparities are not exacerbated by genomic or precision health technologies) requires us to acknowledge the negative effects that immigration policy and criminal justice policy have on the involvement of immigrants in such research and on their health directly. I conclude that it is not a question of whether the law is a help or a threat but, rather, whether we collectively will prioritize authentic diversity and inclusion policies and also insist on compliance with the laws intended to ensure the human right of every individual – regardless of immigration status or national origin – to share in the advancement of science. *Ethn Dis.* 2019;29(Suppl 3): 641-650; doi:10.18865/ed.29.S3.641

INTRODUCTION

Recognition has grown of the importance of diversity and inclusion of underrepresented and underserved minority populations, including immigrant populations, in genomic research and precision medicine.[1-8] Enrollment in the *All of Us*^{SM} Research Program, for example, is open to any adult individual residing in the United States regardless of citizenship, immigration status, or national origin, and the protocol (v.1.7.Mar.2018) emphasizes a commitment to include "minority populations who are historically underrepresented in biomedical research." Achieving diversity has been difficult[2,3,7] and has led some scholars to question whether the law is a help or a threat to the inclusion of underserved or underrepresented immigrant populations.

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Accepting the assertion that inclusion of immigrants is both scientifically and ethically desirable and hoping to assist critical dialogues regarding responsible, inclusive design, this article provides an overview of some of the

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relevant legal issues affecting the inclusion of immigrants in genomic research and precision health initiatives after first noting foundational methodological and ethical issues. Awareness of these issues is important for anyone concerned that racial and ethnic health disparities will not be alleviated by emerging genomic and precision health technologies or the surveillance enabled by the unprecedented levels of aggregated individualized data through those efforts.

WHICH IMMIGRANTS? METHODOLOGICAL AND ETHICAL CONSIDERATIONS

Before exploring the legal considerations affecting underserved and underrepresented immigrant populations' involvement in precision health and genomic research, it is necessary to establish what we mean by this. A number of facts about immigrants in the United States are noteworthy to ensure vast heterogeneity is neither overlooked nor ignored. According to the PEW Research Center,[9] approximately 13.5% of the US population comprises immigrants; approximately 75% of immigrants are in the United States lawfully; 46% of immigrant populations live in three states (California, Texas, and New York); 65% of US immigrants reside in fewer than two dozen metropolitan areas (with largest numbers in New York, Los Angeles, and Miami); the top three places of birth for immigrants in the United States are Mexico, India, and China; and since 2010, new arrivals of Asian immigrants each year have outnumbered Hispanic new arrivals. The PEW Research Center has also described in detail variation in English language proficiencies, educational attainment, income, and line of work across immigration statuses.

What do we mean by underserved or underrepresented? Without explicit articulation of the gaps intended to be filled, people could be thinking of quite different groups: refugees and asylum seekers; trafficked persons; immigrants residing in rural areas rather than metropolitan areas; undocumented immigrants; immigrants from particular subpopulations (eg, African immigrants could include individuals from 54 different countries and of innumerable ethnic groups); residents from US territories of Guam, Puerto Rico, American Samoa, Commonwealth of Northern Mariana Islands, and the US Virgin Islands (all of which are often considered immigrants for purposes of research); or immigrants with low incomes or limited English proficiency. It is essential for the terms to be operationalized and researchers to be explicit. In this article, "underserved" refers to access to, or provision of, precision health care services and "underrepresented" refers to research involvement.

Nevertheless, immigration status is rarely measured in health research and, when it is, immigration status is measured inconsistently or done through use of proxy measures (eg, lack of a valid social security number, lack of a driver's license, survey response indicating deportation fears, occupation as a day laborer, or receipt of public health insurance benefits such as Emergency Medicaid).[10] The National Institutes of Health (NIH) is required by law (ie, the National Institutes of Health Revitalization Act of 1993, Pub. L. 103-43) to ensure the inclusion of minorities in research. And while US immigrant populations are highly diverse and research to address immigrant health disparities has been encouraged, researchers typically do not distinguish immigrant participants (regardless of documented status) from non-immigrant participants in their inclusion reporting. In practice, immigrants participating in genomic research are reported along with non-immigrant participants in the race and ethnicity reporting categories, potentially masking meaningful heterogeneity and omitting potentially relevant information to understand social determinants of their health. Another methodological challenge is that health care providers generally do not have an affirmative duty to collect immigration status information from patients.[11] While federal financial incentives for electronic health records (EHRs) have been offered as part of Meaningful Use Stage 2 to encourage the collection of standardized race and ethnicity data as well as preferred language,[12] no similar incentives have been offered to promote the collection of standardized measures of immigration status in EHRs despite their utility in understanding immigrant health disparities.[13] Researchers have noted the importance of careful research design (such as collecting data anonymously or pursuant to assurances of confidentiality) to avoid chilling effects from the collection of this sensitive information, as immigrants are reasonable to worry that information will be used against them (eg, if health providers were to report undocumented patients to federal officials despite not having a duty to do so[11]).

In addition to scientific considerations about whether or how best to measure or collect immigration status data, when researchers seek to include immigrants in genomic research and precision health initiatives, an assessment of their contextual vulnerabilities and corresponding research participant protections is appropriate.[14-16] Non-citizen immigrants have been described as "the canaries in the health care coal mine... among the most vulnerable groups in the United States."[17] Yet other immigrant populations might not share a heightened risk of coercion or undue influence due to limited mobility, income, education, or other factors. While the Common Rule (45 CFR §46.101 *et seq.*) does not require additional protections for immigrants categorically in the way that it does pregnant women, children, or prisoners, characteristics of particular immigrant populations could affect the evaluation of whether risks are reasonable relative to anticipated benefits and whether selection of participants is equitable. When a protocol promises the return to participants of "medically actionable" results without offering to provide downstream medical services, one must consider the potential financial and psychological hardships that could be experienced by those economically disadvantaged, ineligible for health care coverage, or facing other health care access barriers because of their immigration status.[18]

Because the concept of immigrants encompasses foreign-born individuals, lawful permanent residents, naturalized citizens, temporary migrants, refugees, asylum seeker, and undocumented immigrants, responsible inclusion of immigrant populations in genomic research requires thoughtful consideration of how each will be involved and how their distinct needs and interests will be adequately protected. For example, one cannot simply assume that documented immigrants are immune to the research risks posed to undocumented immigrants (eg, many immigrant families are mixed status). Focusing research on only one particular immigrant population or subpopulation, for example, runs the risk of reinforcing stereotypes and stigmatization.[19] Novel approaches to the informed consent process offer one way to improve the inclusivity of research,[20] as does use of culturally sensitive terminology and preferred languages. Culturally responsive relational reflexive ethics-oriented research and community-based participatory research have also been advocated.[15,21] Appreciating immigration "outside of the law" and accounting for three historical conceptualizations of US immigration policy (eg, immigration as transition, as contract, and as affiliation), each with potential implications for weighing research participation risks and benefits (eg, presumptions of equality, "unequal justice", and "earned equality") could be important for those hoping to bridge health and immigration policy spaces.[22-23]

Researchers planning to exclude immigrants in genomic and precision health research should also be familiar with these intrinsic, extrinsic, and procedural ethical issues in order to articulate why inclusion is infeasible or inappropriate. It is perhaps unreasonable to expect and unwise to mandate that scientists for each study anticipate, plan, and dedicate limited research resources for every possibility. Weighing competing principles of respect for persons, beneficence, and justice may involve consideration of practicablity.[24] Inclusive design might be outweighed if, for example, the steps necessary for responsible inclusion (such as study personnel fluent and study materials available in every language or establishing and monitoring tiered access to "sensitive" research specimens and data) would divert such a large proportion of the study's allocated resources that the study's specific goals are jeopardized. Inclusion of a specific group and exclusion of another group (such as the inclusion of documented immigrants but exclusion of undocumented immigrants) might be justified in a situation in which a study's goals can be achieved—and, importantly, the benefits from the study's findings can be distributed fairly across social groups to participants and non-participants—without unnecessarily burdening the disadvantaged, marginalized social group with risks from research participation. Ultimately, ethical literacy is critical to successful and equitable scientific research.

LEGAL CONSIDERATIONS

The law as appearing on the books might serve as a help or a threat to the inclusion of underserved and underrepresented immigrant populations in precision health and genomic research. Discussion of laws that guide research inclusion of underserved and underrepresented immigrants are presented in four categories: an international human right to facilitate inclusion; federal statutory rights to facilitate inclusion; legal restrictions on data access and use to serve alternatively as facilitators or threats to inclusion; and a barrier to inclusion posed by criminalization of immigration violations.

An International Human Right to Participate in Science and Share in Its Benefits

Since 1948, with the adoption of the Universal Declaration of Human Rights (UDHR), there has been a recognized human right of everyone, regardless of immigration status, "to participate...and share in scientific advancement and its benefits" (UDHR, Article 27). The International Convention for the Elimination of All Forms of Racial Discrimination (ICERD), signed by the United States in 1966 and ratified in 1994, further affords the right to be free from racial discrimination in all facets of society. Prohibiting both policies of discriminatory treatment and impacts, ICERD uses a broad definition of race encompassing race, color, descent, and national or ethnic origin. While this treaty has been in full force as binding "law of the land" since its ratification, the United States has been admonished for falling short of its obligations, including for failing to end discriminatory immigration enforcement programs or adequately addressing health and health care disparities for minorities and undocumented immigrants. The Universal Declaration on the Human Genome and Human Rights adopted unanimously in 1997 by the United Nations Education, Scientific, and Cultural Organization (UNESCO)—an international body from which the United States withdrew in 2018—further acknowledges the "[b]enefits from advances in biology, genetics and medicine concerning the human genome, shall be made available to all, with due regard for the dignity and human rights of each individual" (Article 12) without mention of immigration status. Further normative guidance comes from the International Declaration on Human Genetic Data, adopted in 2003, which reiterates nondiscrimination rights, warns of data essentialism or reductionism, and underscores each individual's right to access his or her own genetic data.

Federal Statutory Rights under the Genetic Information Nondiscrimination Act (GINA), the Affordable Care Act (ACA), and the 21st Century Cures Act

The genetic nondiscrimination rights offered by the Genetic Information Nondiscrimination Act (Pub. L. 110-233, 122 Stat. 881. *et seq.* [2008]), passed expressly to allay concerns and promote participation in research, apply to everyone in the United States, regardless of citizenship or immigration status. GINA prohibits the use of genetic information in health insurance and employment decisions and establishes confidentiality requirements whenever covered entities possess genetic information.

While the Affordable Care Act (Pub. L. 111-148, 124 Stat. 119 *et seq.* [2010]) has not expanded health coverage to everyone (eg, only those "lawfully present" are eligible to seek marketplace health care benefits), the law prohibits the government from using marketplace applicants' data for any purpose other than determining eligibility for exchange benefits (ACA §1411(g)). The penalty for breaking this confidentiality is a $25,000 fine for each improper use or disclosure. The law also provides a right to be free from discrimination in health care and research activities on the basis of national origin (ACA §1557); however, national origin is not synonymous with citizenship or immigration status. According to the Department of Health and Human Services (DHHS), national origin "includes, but is not limited to, an individual's place of origin (such as country or world region) or an individual's manifestation of the physical, cultural, or linguistic characteristics of a national origin group."[25] While applicable to health and research, this nondiscrimination provision was not intended to drastically alter how research is conducted (eg, by mandating specific inclusion or exclusion criteria).[25]

The 21st Century Cures Act (Pub. L. 114-255, 130 Stat. 1033 *et seq.* (2016)) is particularly important to the inclusion of immigrants in genomic research and precision health initiatives. Generally speaking, legal status is not itself considered protected health information under the Health Information Portability and Accountability Act (HIPAA). As per the 21st Century Cures Act §2012, the NIH automatically issues a "Certificate of Confidentiality" for collection of identifiable, sensitive information collected for biomedical, behavioral, and clinical research funded wholly or partially by the NIH. Compliance by NIH-funded researchers with the nondisclosure responsibilities is mandatory, and data collected in such a study cannot be disclosed without the participant's consent even as part of most legal proceedings. Participants need not be US citizens or reside in the US in order to fall under a certificate's protective umbrella, and the protections are to last in perpetuity.[26] While certificates protect any copies of the data, placement of research data into an EHR might compromise the confidentiality shield in ways not yet thoroughly understood.

Restrictions on Data Access for Purposes Other Than the Purpose for Which It Was Collected

One challenge when thinking about the inclusion of immigrants in genomics research is the level of trust in government (and institutions funded by or collaborating with the government) and need to assure participants that data collected will be used only for the stated purposes of health research. Willingness to participate in research and give specific types or amounts of data is contextual. Data sharing between governmental agencies might make immigrant participants particularly uncomfortable. Moreover, assurances that data from one study will be kept confidential might be difficult for immigrant populations (or others) to reconcile with partnerships and data sharing in other situations. A few examples follow to help illuminate the murky sociopolitical context within which genomic research and precision health initiatives involving underrepresented or underserved immigrant populations must be considered.

The US Census, Citizenship, and the 72-Year Rule

Census data are an important basis for much scientific research. The "72-Year Rule" (92 Stat. 915, P.L. 95-416 [1978]) requires individual-level Census data to be kept confidential for 72 years before it is accessible through the National Archives.[27] Census employees can be penalized up to 5 years in prison, $250,000 fine, or both for violations of nondisclosure obligations.[27] Census response data are exempt from Freedom of Information Act requests, and personal data cannot be used against an individual in legal process as per 13 U.S.C. §9. Nevertheless, fears that information collected for the Census will be used to harm respondents personally has historically been a sizable problem, and the 2020 Census is not likely to deviate from this challenge.[28,29] The potential inclusion of a citizenship question sparked litigation and widespread criticism that it will cause a dramatic undercount, with immigrant households (documented, mixed status, and undocumented alike) unlikely to respond.[28] Unlike health research surveys, responses to the US Census questions are not optional. Reponses are required by law, and those who refuse to respond or provide false information can be fined up to $100 or $500, respectively (U.S. Code Title 13, Section 221). An undercount could have a direct effect on the reliability of demographic data used in health research. Long-standing partnerships wherein the Census Bureau serves as a data collection agent for DHHS (such as conducting interviews for the National Health Interview Survey, which it has done since 1957) might confuse the public about which data are shared (or not) and which surveys administered by the Census are voluntary (or not). The fear that response data might be used by the government against an individual despite confidentiality requirements is not unfounded or unreasonable in light of the discovery that 1940 census data were used to target and intern individuals of Japanese ancestry during World War II when confidentiality provisions were relaxed.[30]

Research Incentives and Reporting of Taxable Income to the Internal Revenue Service (IRS)

Researchers and institutional review boards (IRBs) aim to treat similarly situated research participants equally. Generally, research participation incentives cannot be provided at different rates to different study arms if those in each study arm are asked to perform the same study tasks. When researchers include immigrants, however, they might find themselves in a situation where moral and legal obligations seem in conflict. For example, the IRS requires institutions to report payments of research incentives of more than $600 per calendar year to any individual. When the participant is a nonresident immigrant, the IRS requires an institution to withhold 28% for taxes using a Form 1042-S.[31] Institutions vary widely in how they comply with the IRS requirements, sometimes mandating the collection of social security numbers (SSNs) or individual tax identification numbers (ITINs) along with research data.[32] Section 6103 of the Internal Revenue Code provides confidentiality and asserts that an ITIN is not used for immigration enforcement or otherwise shared by the IRS. Nevertheless, researchers must think carefully about how to reconcile their moral obligation to treat research participants equitably while complying with IRS-imposed reporting and withholding rules (eg, upon what amount is equitable treatment of participants based: the outgoing expenditure for the researcher or the amount received by the participant after applicable tax withholdings?) and be able to explain their approach convincingly to prospective participants. In doing so, avoidance of language from the legal authorities (such as "taxation of aliens") that could be offensive and dehumanizing to prospective participants is wise.

Health Providers, Researchers, or Agencies Perceived as Quasi-Immigration Enforcement Agents

The National Immigration Law Center (NILC) has recommended[11] that health care providers avoid collecting data on immigration status and, if collecting it, sequester the information from medical and billing records. While one can appreciate the NILC's rationale, such a recommendation is not feasible for precision health efforts seeking to address immigrant health disparities. Thus, it will be incumbent upon researchers to alleviate concerns that underserved immigrants might have that their presence at medical facilities to obtain care or participate in research elevates their risk of deportation or immigration-related enforcement.[33-34] As per Immigration and Customs Enforcement (ICE) policy,[35] immigration enforcement actions (eg, apprehensions, arrests, interviews, or searches) are not to occur at "sensitive locations" (ie, hospitals, health care facilities, schools, and places of worship), and legislation has already been proposed to strengthen these safe spaces (eg, S.845 and HR.1815 "Protecting Sensitive Locations Act"). On the other hand, the involvement of DHHS in the forced family separations at the US-Mexico border (and their role in DNA testing as a requirement for familial reunification) prompted legislative action to protect genetic privacy[36] and ultimately might undermine efforts to earn the support of underrepresented and underserved immigrant populations necessary for successful, sustainable inclusion in genomic research and precision health initiatives.

Criminalization of Immigration Violations Raises Regulatory Barriers for Research

Historically, immigration documentation violations were generally handled as civil not criminal matters. The dramatic shift in immigration policy[37] by the Trump administration in 2018 to prosecute all immigration matters has serious implications for including undocumented immigrant populations, refugees, and asylum seekers in research. Immigrants who are detained by the government are, for purposes of research participation protections, considered prisoners. When reforms were made to modernize the Common Rule, Subpart C of 45 C.F.R. part 46 was left unmodernized.[38,39] These regulatory barriers would complicate any study that intentionally (ie, more than incidentally) seeks to involve such immigrants in research and would also necessitate the suspension of research-related interactions with any enrolled immigrant participant who subsequently becomes detained.

DISCUSSION

Whether the law is a help or a threat to the inclusion of immigrants in genomic research and precision health depends not only on the law on the books but also on respect for rule of law and its stable enforcement. Genomic and precision health research and health care policy in the United States cannot be tidily compartmentalized from the messiness of society generally or immigration policy specifically. Restrictive immigration policies and xenophobia have negative health consequences and affect health care utilization.[40-42] Such policies—themselves worthy of focused legal epidemiological study[43]—make it more difficult to involve immigrants not only as research participants but also as health care providers and researchers.[44,45] Research recruitment, retention, and data collection plans for large-scale studies backed by the federal government must be designed with this legal and socio-political context in mind and both anticipate and be responsive to changing conditions. For example, the initial protocol development for the *All of Us* Research Program in early 2017 coincided with President Trump's issuance of Executive Orders 13769 and 13780 (ie, the travel bans),[46,47] which inevitably influenced the development of the core survey modules. The timing of the project's national launch in mid-2018 was similarly challenging: 1) it coincided with the heavily criticized separation of families at the US-Mexico border and DHHS's involvement in DNA testing of the detained migrants[48]; and 2) it continued in the midst of the Supreme Court's decision to uphold a revised travel ban.[49,50] Many researchers fret over how to be on the right side of science and history without jeopardizing governmental and public support for their projects or putting participants unnecessarily at risk of discriminatory harms.

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This article has outlined only a sampling of the many methodological, ethical, and legal considerations involved with the inclusion of immigrants in genomic research and precision health. There are many reasons for immigrants to be reluctant when approached to participate in such efforts in the United States today, despite the scientific benefits that would accrue from diversity in research cohorts and the many assurances of confidentiality based in study protocols and law. When a president declares a "national emergency" pursuant to the National Emergencies Act (50 U.S.C. §1601-1651 [1976]), that declaration triggers authority pursuant to 42 U.S.C. §1320b-5 for the DHHS Secretary to waive the HIPAA privacy rights (including those under 45 CFR 164.510, 164.520, and 164.522) of everyone in the emergency area and for the duration of the emergency. Awareness of such consequences and thinking about other scenarios in which confidentiality could be relaxed or compromised (even if temporarily) might cause many to pause before accessing health care or agreeing to provide significant amounts of identifiable data to a government-backed study. When inter-agency data sharing policies are set pursuant to a Memorandum of Understanding (MOU) (such as that between DHHS and the Department of Homeland Security[51]) and a president publicly states that MOUs "don't mean anything...,"[52] it is foreseeable that such comments will deter immigrant populations (such as refugees who might have affiliative claims challenged or undocumented immigrants who might face deportation proceedings if sensitive identifiable information is disclosed) from participating by suggesting, fairly or not, that the government is unlikely to fulfill its promises to restrict use of the identifiable data collected exclusively for precision health research or restrict access to authorized researchers. Revisiting longitudinal study protocols and making adjustments to ensure continued fairness in the selection of participants and adequacy of research protections is important, particularly during volatile sociopolitical times.

Conclusion

When tasked with answering the question of whether the law is a help or a threat to the inclusion of underrepresented or underserved immigrant populations in genomic research and precision health, we must redirect the inquiry to whether we collectively: 1) can prioritize authentic diversity and inclusion policies (not only in health care and research but every facet of our lives); and 2) insist on compliance with laws intended to ensure the human right of every individual – regardless of immigration status or national origin – to share in the advancement of science and its benefits.

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References

1. Bustamante CD, Burchard EG, De la Vega FM. Genomics for the world. *Nature*. 2011;475(7355):163-165. https://doi.org/10.1038/475163a PMID:21753830
2. Popejoy AB, Fullerton SM. Genomics is failing on diversity. *Nature*. 2016;538(7624):161-164. https://doi.org/10.1038/538161a PMID:27734877
3. Bentley AR, Callier S, Rotimi CN. Diversity and inclusion in genomic research: why the uneven progress? *J Community Genet*. 2017;8(4):255-266. https://doi.org/10.1007/s12687-017-0316-6 PMID:28770442
4. Hindorff LA, Bonham VL, Ohno-Machado L. Enhancing diversity to reduce health information disparities and build an evidence base for genomic medicine. *Per Med*. 2018;15(5):403-412. https://doi.org/10.2217/pme-2018-0037 PMID:30209973
5. Hindorff LA, Bonham VL, Brody LC, et al. Prioritizing diversity in human genomics research. *Nat Rev Genet*. 2018;19(3):175-185. https://doi.org/10.1038/nrg.2017.89 PMID:29151588
6. Popejoy AB, Ritter DI, Crooks K, et al; Clinical Genome Resource (ClinGen) Ancestry and Diversity Working Group (ADWG). The clinical imperative for inclusivity: Race, ethnicity, and ancestry (REA) in genomics. *Hum Mutat*. 2018;39(11):1713-1720. https://doi.org/10.1002/humu.23644 PMID:30311373
7. Landry LG, Ali N, Williams DR, Rehm HL, Bonham VL. Lack of diversity in genomic databases is a barrier to translating precision medicine research into practice. *Health Aff (Millwood)*. 2018;37(5):780-785. https://doi.org/10.1377/hlthaff.2017.1595 PMID:29733732
8. Sierra-Mercado D, Lázaro-Muñoz G. Enhance diversity among researchers to promote participant trust in precision medicine research. *Am J Bioeth*. 2018;18(4):44-46. https://doi.org/10.1080/15265161.2018.1431323 PMID:29621450
9. Lopez G, Bialik K, Radford J. *Key Findings about U.S. immigrants*. June 17, 2017. PEW Research Center. Last accessed Sept 23, 2019 from https://pewrsr.ch/2rdqfXK.
10. DeTrinidad Young M-E, Madrigal DS. Documenting legal status: a systematic review of measurement of undocumented status in health research. *Public Health Rev*. 2017;38(1):26. https://doi.org/10.1186/s40985-017-0073-4 PMID:29450097
11. National Immigration Law Center. *Health Care Providers and Immigration Enforcement: Know your Rights, Know your Patients' Rights*. April 2017. Last accessed Sept 23, 2019 from https://www.nilc.org/issues/immigration-enforcement/healthcare-provider-and-patients-rights-imm-enf/
12. *Public Health and Promoting Interoperability Programs (formerly known as Electronic Health Records Meaningful Use): Introduction*. Centers for Disease Control and Prevention. Last reviewed: September 9, 2019. Last accessed Sept 23, 2019 from https://www.cdc.gov/ehrmeaningfuluse/introduction.html.
13. Hamilton TG. The healthy immigrant (migrant) effect: in search of a better native-born comparison group. *Soc Sci Res*. 2015;54:353-365. https://doi.org/10.1016/j.ssresearch.2015.08.008 PMID:26463553
14. McLaughlin RH, Alfaro-Velcamp T. The vulnerability of immigrants in research: enhancing protocol development and ethics review. *J Acad Ethics*. 2015;13(1):27-43. https://doi.org/10.1007/s10805-015-9225-7
15. Lahman MKE, Mendoza BM, Rodriguez KL, Schwartz JL. Undocumented research participants: ethics and protection in a time of fear. *Hisp J Behav Sci*. 2011;33(3):304-322. https://doi.org/10.1177/0739986311414162
16. Birman D. Ethical issues in research with immigrants and refugees. In: Timble JE, Fisher CB, eds. *The Handbook of Ethical Research with Ethnocultural Populations & Communities*. Thousand Oaks, CA: SAGE; 2006:156-177. https://doi.org/10.4135/9781412986168.n9
17. Parmet WE. Immigration and health care under the Trump administration. *Health Affairs Blog*, January 18, 2018. https://doi.org/10.1377/hblog20180105.259433
18. Hacker K, Anies M, Folb BL, Zallman L. Barriers to health care for undocumented immigrants: a literature review. *Risk Manag Healthc Policy*. 2015;8:175-183. https://doi.org/10.2147/RMHP.S70173 PMID:26586971
19. Achkar JM, Macklin R. Ethical considerations about reporting research results with potential for further stigmatization of undocumented immigrants. *Clin Infect Dis*. 2009;48(9):1250-1253. https://doi.org/10.1086/597587 PMID:19292662
20. Kraft SA, Doerr M. Engaging populations underrepresented in research through novel approaches to consent. *Am J Med Genet C Semin Med Genet*. 2018;178(1):75-80. https://doi.org/10.1002/ajmg.c.31600 PMID:29512940
21. Vaughn LM, Jacquez F, Lindquist-Grantz R, Parsons A, Melink K. Immigrants as

research partners: a review of immigrants in community-based participatory research. *J Immigr Minor Health*. 2017;19(6):1457-1468. https://doi.org/10.1007/s10903-016-0474-3 PMID:27491305

22. Motomura H. *Immigration Outside the Law*. New York, NY: Oxford University Press; 2014.
23. Motomura H. *Americans in Waiting: The Lost Story of Immigration and Citizenship in the United States*. New York, NY: Oxford University Press; 2006.
24. Bombard Y, Brothers KB, Fitzgerald-Butt S, et al. The Responsibility to Recontact Research Participants after Reinterpretation of Genetic and Genomic Research Results. *Am J Hum Genet*. 2019;104(4):578-595. https://doi.org/10.1016/j.ajhg.2019.02.025 PMID:30951675
25. Department of Health and Human Services. Nondiscrimination in Health Programs and Activities; Final Rule. *Federal Register*. 2016; 81(96): 31375-31473 (31385 and 31467).
26. National Institutes of Health. *What is a Certificate of Confidentiality?* Updated January 15, 2019. Last accessed Sept 23, 2019 from https://grants.nih.gov/policy/humansubjects/coc/what-is.htm
27. U.S. Census Bureau. *Availability of Census Records about Individuals*. June 2008. Last accessed February 17, 2019 from https://www.census.gov/history/pdf/cff2.pdf
28. Jordan, M. If census asks about citizenship, some already have an answer: no comment. *New York Times*. March 27, 2018. Last accessed February 17, 2019 from https://www.nytimes.com/2018/03/27/us/census-undocumented-immigrants.html.
29. Wang HL. Supreme Court to decide whether 2020 Census will include citizenship question. NPR. February 15, 2019. Last accessed February 17, 2019 from https://www.npr.org/2019/02/15/692656180/supreme-court-to-decide-if-2020-census-includes-citizenship-question
30. Aratani L. Secret use of census info helped send Japanese Americans to internment camps in WWII. *Washington Post*. April 6, 2018. Last accessed February 25, 2019 from https://www.washingtonpost.com/news/retropolis/wp/2018/04/03/secret-use-of-census-info-helped-send-japanese-americans-to-internment-camps-in-wwii/?utm_term=.f92b7f0eb790.
31. Internal Revenue Service. Publication 515: *Withholding of Tax on Nonresident Aliens and Foreign Entities*. Updated February 14, 2019. Last accessed February 17, 2019 form https://www.irs.gov/pub/irs-pdf/p515.pdf.
32. DuBois, JM. Crossing a boundary? Many researchers are required to collect the Social Security numbers of participants to process payments to them. Is that asking too much? *Am Psychological Assoc.* 2015; 46(2): 70. https://www.apa.org/monitor/2015/02/ethics.
33. Elejalde-Ruiz A. Fear, anxiety, apprehension: immigrants fear doctors' visits could leave them vulnerable to deportation. *Chicago Tribune*. February 22, 2018. Last accessed February 17, 2019 from https://www.chicagotribune.com/business/ct-biz-immigration-fears-hurt-health-care-access-0225-story.html.
34. Karlamangla S. Amid deportations, those in U.S. without authorization shy away from medical care. *Los Angeles Times*. April 6, 2018. Last accessed February 17, 2019 from https://www.latimes.com/local/california/la-me-ln-immigration-health-20180406-htmlstory.html.
35. US Immigration and Customs Enforcement. *FAQ on Sensitive Location sand Courthouse Arrests*. Updated September 25, 2018. Last accessed February 17, 2019 from https://www.ice.gov/ero/enforcement/sensitive-loc.
36. Meadows N. Legislation funding NIH also protects genetic privacy of vulnerable families. *The ASHG Blog*. November 30, 2018. Last accessed February 25, 2019 from https://blog.ashg.org/2018/11/30/genetic-privacy-vulnerable-families/.
37. Brennan L. Sessions is criminalizing immigration violations. That upends centuries of history. *Washington Post*. May 10, 2018. Last accessed February 25, 2019 form https://www.washingtonpost.com/news/posteverything/wp/2018/05/10/sessions-is-criminalizing-immigration-violations-that-upends-centuries-of-history/?utm_term=.5165d372b87a.
38. Huang E, Wagner JK. The indefinite "stay" on regulatory reforms for research with prisoners. *Am J Bioeth*. 2017;17(7):55-57. https://doi.org/10.1080/15265161.2017.1328534 PMID:28661746
39. Huang E, Cauley J, Wagner JK. Barred from better medicine? Reexamining regulatory barriers to the inclusion of prisoners in research. *J Law Biosci*. 2017;4(1):159-174. https://doi.org/10.1093/jlb/lsw064 PMID:28852561
40. Martinez O, Wu E, Sandfort T, et al. Evaluating the impact of immigration policies on health status among undocumented immigrants: a systematic review. *J Immigr Minor Health*. 2015;17(3):947-970. https://doi.org/10.1007/s10903-013-9968-4 PMID:24375382
41. Suleman S, Garber KD, Rutkow L. Xenophobia as a determinant of health: an integrative review. *J Public Health Policy*. 2018;39(4):407-423. https://doi.org/10.1057/s41271-018-0140-1 PMID:30177729
42. Perreira KM, Pedroza JM. Policies of exclusion: implications for the health of immigrants and their children. *Annu. Rev. Public Health*. 2019; 40: 7.1-7.20. https://doi.org/10.1146/annurev-publhealth-040218-044115
43. Burris S, Ashe M, Levin D, Penn M, Larkin M. A transdisciplinary approach to public health law: the emerging practice of legal epidemiology. *Annu Rev Public Health*. 2016;37(1):135-148. https://doi.org/10.1146/annurev-publhealth-032315-021841 PMID:26667606
44. American Immigration Council. *Foreign-Trained Doctors Are Critical to Serving Many U.S. Communities*. January 17, 2018. Last accessed February 17, 2019 from https://www.americanimmigrationcouncil.org/research/foreign-trained-doctors-are-critical-serving-many-us-communities.
45. Ducharme J. Trump's immigration policies are making it harder for foreign doctors to work in the US— and that could hurt patients. *Time*. June 8, 2018. Last accessed Sept 23, 2019 from http://time.com/5299488/international-medical-graduates/.
46. President Donald J. Trump. *Executive Order 13769: Protecting the Nation from Foreign Terrorist Entry into the United States*. January 27, 2017. Last accessed February 17, 2019 from https://www.whitehouse.gov/presidential-actions/executive-order-protecting-nation-foreign-terrorist-entry-united-states/.
47. President Donald J. Trump. Executive Order 13780: *Protecting the Nation from Foreign Terrorist Entry into the United States*. March 6, 2017. Last accessed February 17, 2019 from https://www.whitehouse.gov/presidential-actions/executive-order-protecting-nation-foreign-terrorist-entry-united-states-2/.
48. Ray T. Reported DNA Testing on migrants raises questions. *Genome Web*. July 5, 2018. Last accessed February 28, 2019 from https://www.genomeweb.com/policy-legislation/reported-dna-testing-migrants-raises-questions-concerns#.XHiKFy3MyyB.
49. *Presidential Proclamation Enhancing Vetting Capabilities and Processes for Detecting Attempted Entry into the United States by Terrorists or Other Public-Safety Threats*. September 24, 2017. Last accessed February 17, 2019 from https://www.whitehouse.gov/presidential-actions/presidential-proclamation-enhancing-vetting-capabilities-processes-detecting-attempted-entry-united-states-terrorists-public-safety-threats/.
50. Liptak A, Shear MD. Trump's travel ban is upheld by Supreme Court. *New York Times*. June 26, 2018. Last accessed February 17, 2019 from https://www.nytimes.com/2018/06/26/us/politics/supreme-court-trump-travel-ban.html.

51. Rodriguez J. How does information sharing between DHS and other non-enforcement executive agencies work? *Bipartisan Policy Center*. April 17, 2018. Last accessed February 28, 2019 from https://bipartisanpolicy.org/blog/how-does-information-sharing-between-dhs-and-other-non-enforcement-executive-agencies-work/.
52. Mason J. No more MOUs! USTR Lighthizer tweaks trade terminology after dispute with Trump. *Reuters*. February 22, 2019. Last accessed Sept 23, 2019 from https://www.reuters.com/article/us-usa-trade-china-trump/no-more-mous-ustr-lighthizer-tweaks-trade-terminology-after-dispute-with-trump-idUSKCN1QB2OR